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ABSTRACT

The import of cognitive style research for educational problems and research is discussed. Topics covered include a definition of "cognitive style," particularly "field dependence/independence," individual differences in personal characteristics associated with differences in perceptual mode (field independence) relevance of cognitive style research to educaticnal research, a review of research relating differences in cognitive style to individual differences in teaching and learning, and possible directions for future research. (Author)

# Cognitive Style and the Teaching-Learning Process*

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Of the vast domain our title gives us license to roam in, we intend to examine only one narrow sector: the consequences for learning of the ways in which students with different cognitive styles respond to particular teaching approaches, and particular learning situations. Narrowing our undertaking even further, we will consider one cognitive style, the well-studied field-dependence-independence dimension, and we will limit ourselves to the effects of the personal characteristics associated with this cognitive style, not considering at this time the obviously important effects of its directly cognitive aspects. Application of a cognitive-style approach to study of the classroom situation is in its beginning stages. Accordingly, for some of the questions to be examined direct evidence is quite sparse. However, the literature on cognitive styles now available often provides a basis for proposing answers to these questions, or, at the very least, suggestions for research through which they may be pursued.

For the sake of background, a brief word should be said about cognitive styles in general and the field-dependence-independence style in particular. (For an extended account of the field-dependence-independence style see: Witkin, Lewis, Hertzman, Machover, Meissner & Wapner, 1954; Witkin, Dyk, Faterson, Goodenough & Karp, 1962.) The concept of cognitive styles had its origin many years ago in the observation of self-consistency in an individual's way of handling a wide range of perceptual and intellectual

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tasks. Hence, the designations "cognitive" and "style." As further research pursued these self-consistencies into other psychological areas, it quickly became apparent that the modes of functioning expressed in a particular cognitive style could be found, in congruent form, in the ~~individual's personality~~ and social behavior as well. Despite such evidence that these stylistic dimensions are clearly very broad in scope, the original narrow label, "cognitive styles," persists. Because of the recognition it gives to the extra-cognitive components involved, a designation such as "personal styles" now seems more appropriate, but old ways, and even more, old labels, die hard. Whatever we call them, these styles may now be conceived as our typical ways of processing information, regardless of whether the information has its primary source in the world outside or within ourselves; and, when in the world outside, regardless of whether the information is provided primarily by things or by other persons and their doings.

By now a number of cognitive styles have been identified, among them the field-dependence-independence style, again a label that has persisted from the old days when only the perceptual component of what is now clearly known to be a much broader style had been identified. Relatively field-independent persons tend to experience parts of the field as discrete from the surrounding field, even when the field is so organized as to strongly embed the part; that is, they perceive analytically. Perception of relatively field-dependent persons, on the other hand, is guided by the organization of the field as a whole, so that any part of the field is experienced as continuous with its surround; that is, their perception is global. In solving problems, field-dependent persons take a long time to find the solution to that class of problems--and that class of problems only--where solution requires that a critical element be taken out

of the context in which it is presented and the problem material restructured with the element used in a different context. Relatively field-independent persons solve such problems more rapidly. Paralleling their attentiveness to the prevailing field in laboratory tests of perception, relatively field-dependent persons are particularly attentive to the social field; and in defining their own attitudes, attributes and sentiments, they are likely to take into account the points of view of others. Associated with this kind of social orientation, field-dependent persons give evidence of considerable social sensitivity and often of developed social skills as well. In contrast, relatively field-independent persons show greater interest in the more impersonal, abstract aspects of the surround. Finally, field-dependent persons are likely to use global defenses, such as repression and denial; field-independent persons are likely to use specialized defenses, such as intellectualization and isolation. So you can see, "field dependent" and "field independent" are labels for clusters of characteristics, both cognitive and personal, justifying the designation "personal styles."

As noted, we are limiting ourselves here to examining the implications for learning of the personal components of these clusters only. In particular we want to focus on the implications of the more social orientation of relatively field-dependent persons and of the more impersonal orientation of relatively field-independent persons. There is now a good deal of evidence that the tendency toward one orientation or the other shows itself pervasively, and is applied quite automatically, in an individual's interaction with his environment. Let us review some of this evidence.

It is now well documented that relatively field-dependent persons are drawn to people, both in the sense of being interested in what others say, do and feel, and in the sense of liking to have people around them. The

"with-people" orientation of field-dependent persons has been documented in such direct and readily discernible ways as their use of interpersonal space. Three different studies have now demonstrated that field-dependent persons literally prefer to be physically close to others. In one of these studies, subjects were asked to indicate the positions they considered optimal, maximal and minimal for comfortable communication with another person (Holley, 1972). In the second of these studies, subjects were required to prepare a brief presentation on a topic assigned to them, and then to proceed to another room and make the presentation orally to the experimenter seated there (Justice, 1969). In both studies field-dependent subjects, relative to field-independent ones, chose positions significantly closer to the person with whom they were interacting. The third study examined nonverbal behavior of obese patients when seated two feet and five feet from the interviewer (Greene, 1973). At the greater distance, compared to the shorter one, field-dependent persons showed a significant increase in a cluster of nonverbal behaviors which loaded a "dependency" factor, interpreted as expressive of need for closeness and nurturance. Field-independent patients were unaffected by the distance manipulation.

The "with-people" orientation of field-dependent persons has been observed in other real-life situations. Thus, they have been found to favor occupations which require involvement with others--for example, elementary school teaching, selling, rehabilitation counseling. This contrasts with the preference of field-independent persons for occupations in which working with others is not especially important--for example, astronomy, engineering. Field-dependent persons, when in school, have also been found to prefer academic areas in which the people-side of life is paramount--for example, the social sciences. In contrast, relatively field-independent persons have been

shown to favor school subjects which feature the impersonal and abstract--for example, mathematics and the physical sciences. (See Witkin, 1973, for a recent review of studies in this area.)

Joined with this strong interest in people, and the tendency to gravitate towards situations where they will have people around them and even close to them, field-dependent persons are particularly adept at picking up social cues. From many studies, using a variety of approaches and procedures, has come impressive evidence that field-dependent persons have what in effect amounts to a sensitive radar system, selectively attuned to social components of the environment. This skill shows itself in many social modalities. Thus, it has been demonstrated that, compared to field-independent persons, relatively field-dependent persons literally look more at the faces of those with whom they interact (Konstadt & Forman, 1965; Nevill, 1971; Ruble & Nakamura, 1972). They are also especially alert to those words in a verbal communication which are social in meaning (Eagle, Fitzgibbons & Goldberger, 1966; Eagle, Goldberger & Breitman, 1969; Fitzgibbons & Goldberger, 1971; Fitzgibbons, Goldberger & Eagle, 1965; Goldberger & Bendich, 1972); and interacting with another person they are attentive to his rate of speech, and, in fact, if it is different from their own, they are likely to adapt their rate to the rate of the other (Marcus, 1970). Field-dependent persons are also particularly responsive to nuances of emotional expression in people around them. To illustrate, in one study subjects were required to identify each of a series of words, exposed tachistoscopically for very brief periods (Minard & Mooney, 1969). The series of words shown each subject contained some known to be emotionally significant for him and others known to be neutral. Whereas presence or absence of emotional content had a significant effect on word recognition for field-dependent subjects, it made no difference for field-independent subjects.

Still another ingredient of the social orientation of field-dependent persons is the greater account they take of external social referents in defining their own points of view and feelings. Evidence of this comes from studies which examined the effects of a wide range of social referents upon a variety of attitudes, for example: experimenter expectancy upon ratings of photographs (McFall & Schenkein, 1970); the position of a medical authority upon attitudes toward the use of antihistamines (Linton, 1952); a peer's prior rod settings upon adjustment of a rod to the upright (Solar, Davenport & Bruehl, 1969); the social background of a picture upon ratings of characteristics of a person in that picture (Rudin & Stagner, 1958).

With this review as background we may now examine some of the ways in which the differences in orientation between more field-dependent and field-independent children may enter into their responses to the classroom situation, with repercussions for how they learn and what they learn.

First to be considered are the consequences of these contrasting orientations for the sorts of material each kind of child is especially adept at learning. Obviously what is attended to is, on that basis alone, more likely to be learned and remembered; and whatever is made salient by the interest it holds for the learner also stands a better chance of survival in memory. In addition, motivation to learn is likely to be greater when a person feels he is "doing his own thing." Now relatively field-dependent and field-independent persons are not different in sheer learning ability or memory. However, reflecting differences between them in interests, and hence in what is attended to, salient and relevant, field dependents are better at learning and remembering social material and field independents are better at learning and remembering impersonal material. Thus, associated with the tendency

of field-dependent persons literally to look at faces more is their better recall of faces (Crutchfield, Woodworth & Albrecht, 1958; Messick & Damarin, 1964). On a similar basis, they are better at remembering social words (see, for example, Eagle, Fitzgibbons & Goldberger, 1966). The difference in what attracts them has been found to make for opposite outcomes in learning efficiency for field-dependent and field-independent people in the same experimental situation. Thus, in one study, field-dependent people showed greater incidental learning when the incidental material consisted of faces (Messick & Damarin, 1964). In another study, which also used the incidental-learning paradigm, but which employed nonsocial, abstract incidental material, it was field-independent people who did better (Witkin, et al., 1962).

In addition to influencing effectiveness of learning in specific tasks, the difference in orientation between field-dependent and field-independent persons has also been shown to play a role in how well each does in occupations favoring a social or impersonal orientation. To mention just one recent finding, Quinlan and Blatt (1973), in a study of nursing students, observed that students rated high in their performance in psychiatric nursing tended to be field dependent, whereas those rated high in their performance in surgical nursing tended to be field independent.

It is clear from these illustrations that persons designated as "relatively field-dependent" or "relatively field-independent" cannot be arrayed along a better-worse continuum. Each is likely to do better at tasks with requirements matched to his basic orientation. As a reflection of this we found in one of our own studies that the college grade-point averages of extremely field-dependent and field-independent students were not different. However, there was a difference in the mix of courses in which these similar grades were earned. Whereas courses in mathematics and the sciences were more often represented in the field-independent mix, humanities and social science courses

were more common in the field-dependent mix. This picture is consistent with the results of many other studies (see, for example, Chung, 1966; Clar, 1971; DeRussy & Futch, 1971; Glatt, 1969; Krienke, 1969; Linton, 1952; Pierson, 1965; Zytowski, Mills & Paepe, 1969). It should be emphasized that the similarity in grade-point averages between field-dependent and field-independent students was observed in a college population of students who had the option of selecting courses compatible with their orientations. At lower educational levels, where such options are much more limited, the picture may be different. With an enforced curriculum, students of one kind or the other may indeed do better depending on which orientation the curriculum tends to favor.

We turn now to a second way in which the ingredients of what we have called the social orientation of field-dependent persons may influence their behavior in learning situations and make their behavior different from that of field-independent persons. We refer to the effects of social reinforcement. There is now a sizeable literature on the effects of social reinforcement in the learning of relatively field-dependent and field-independent students. From what we have said about the social sensitivity of field dependents, and their greater responsiveness to the views of others, it is not surprising to find that, in general, social reinforcement has a greater impact on field-dependent than field-independent people. Even more interesting are the differential effects of particular kinds of reinforcement. Two examples may be considered. One set of studies examined the influence of general praise and criticism such as "you are doing well" or "you are doing badly" (see, for example, Konstadt & Forman, 1965; Randolph, 1970). The weight of the evidence from these studies suggests that this kind of reinforcement has little effect on the learning of relatively field-independent students. On the other hand, it has a decisive effect on the learning of field-dependent students. More specifically, for field-

dependents, general disapproval has a negative effect while general approval seems to have no influence.

The second kind of reinforcement that has been examined in its impact on the learning of relatively field-dependent and field-independent persons is response-contingent reinforcement (see, for example, Ferrell, 1971; Fitz, 1970). The results of these studies indicate, by and large, that negative reinforcement, administered immediately after a response is made, has a greater impact, in the direction of better learning, on field dependents than field independents. Positive reinforcement following a response seems to have little effect on either kind of learner.

Whether used consciously or unconsciously, social reinforcement is one of the handiest tools in the teacher's armamentarium of devices for perpetuating some student behaviors and obliterating others. Students on their part, again whether aware of these efforts by the teacher or not, react to the teacher's interventions. Common sense and everyday experience in the classroom should make it not at all surprising that reinforcement does not work equally well for all students, or that particular kinds of reinforcement have differential effects on different kinds of students. What is now added by the evidence just reviewed is that field-dependence-independence is an identifiable, salient individual-differences dimension that may be used in predicting which students are likely to be affected by what kinds of reinforcement and the forms these effects are likely to take.

Let us turn now to a third way in which students' cognitive styles may make a difference in their learning. The tendency of field-dependent persons to use external referents is not limited to their social behavior. Whatever the nature of the material they are required to deal with, such people are likely to take its organization as given, rather than attempt to impose an organization of their own. Often in learning, the material to be learned lacks clear inherent structure, creating the requirement that the learner himself provide organization as an aid to learning. Field-dependent persons are likely to have greater difficulty in learning such material compared to field-independent persons who are better able to provide from within themselves the structure that is needed to facilitate learning. On the other hand, when the material to be learned is presented in an already organized form, so that structuring is not particularly called for, field-dependent and field-independent people are not likely to differ in their learning.

Several studies may be cited to illustrate these points. Bruce (1965) required field-dependent and field-independent sixth-grade children to make up stories about each of a series of pictures. Some of these pictures had obvious incongruities. Such pictures placed upon the creator of the story the burden of somehow combining its discordant components into a coherent whole. Other pictures were internally consistent in all their parts, so that creating a coherent story required less organizational effort. The stories produced were rated for level of organization. With incongruous pictures, the stories of field-dependent children earned lower organizational ratings than the stories of the field-independent children. On the other hand, with congruous pictures, there was no difference. In another study Stasz (personal communication) examined the structuring of social-studies

content by field-independent and field-dependent high school teachers and their students in a social-studies minicourse. Structure was inferred from subjects' ratings of similarity of ten general anthropological concepts, such as "culture," "society," and "civilization." Both before and after minicourse instruction, field-dependent teachers and students made fewer distinctions among concepts. For field dependents, concepts clustered into a large, loosely organized group which included most of the concepts. For field independents, concepts clustered into small, tight groups with less overlap across groups.

Field independents' greater ability to organize their experience suggests that they may be better able to provide their own strategies for coding and utilizing information and are less reliant on strategies being provided by the task itself or by someone else. In studying individual differences in the acquisition of a teaching skill from written and video-modeling procedures, Koran, Snow and McDonald (1971) found that these two treatments were differentially effective for more field-dependent and field-independent intern teachers. While video modeling was more effective in general, field-dependent teachers were found to benefit more from the video modeling than field-independent teachers who benefited equally or more from the written modeling. The authors suggest that for the more field-dependent teachers "the video-modeling treatment . . . through explicit, concrete presentation of the stimulus elements . . . may provide a behavioral representation for the learner that he could not generate for himself if given the written-modeling treatment" (p. 226).

In a different type of learning situation, Shapson (1973) investigated hypothesis testing in concept attainment among third graders. Hypotheses formulated by field-dependent children showed a pattern consistent with

what has been called a focusing strategy (Bruner, Goodnow & Austin, 1956)--that is, a strategy where each attribute is systematically tested for relevance to the concept to be attained. Field-dependent subjects showed a pattern consistent with what has been called a local consistency strategy (Gregg & Simon, 1967)--that is, a strategy where an hypothesis is maintained until feedback indicates it must be incorrect. Shapson also found that training procedures, calculated to aid students in the coding and recoding of positive and negative exemplars of the concept, led field dependents to shift to the focusing strategy used by more field-independent students in hypothesis testing.

There are probably many learning situations where, because the material to be learned is not clearly organized, the field-dependent student may be at a disadvantage. Field-dependent students may need more explicit instruction in problem-solving strategies or more exact definition of outcome performance than field-independent students, who may even perform better when allowed to develop their own problem-solving strategies. Careful attention to cognitive-style differences in learning under more structured or less structured conditions, and detailed analysis of the problem-solving skills and strategies assumed for different learning tasks, are necessary to better define instructional procedures facilitating learning for each kind of student.

We turn finally to a fourth way in which students' cognitive styles may enter into their learning behavior. Here we bring in the teacher's cognitive style in its interaction with the student's style. The characteristics associated with cognitive style, noted for students, are evident in teachers as

well, and seem to influence their teaching behavior. Thus, the greater social orientation of field-dependent teachers is reflected in their preference for teaching situations which allow greater interaction with students. Both in lesson planning (Wu, 1967) and in evaluating the effectiveness of different teaching techniques for particular students (Emmerich, personal communication), field-dependent teachers have shown a preference for class discussion, an approach which allows the teacher to use personal, conversational techniques in engaging the student. In comparison, field-independent teachers prefer techniques which reserve for the teacher the organization of the learning situation. Wu (1967) found that field-independent teachers preferred a lecture or discovery approach in their lesson planning. A discovery approach, as well as a lecturing approach, allows the teacher to be the primary director of learning since the teacher is able to plan the questions, exercises, and content he wants his students to be engaged with for the purpose of learning. Field-independent teachers may also use subject-matter questions more frequently as pedagogical tools than field-dependent teachers. Further, there are some indications from a simulation game of teaching that field-independent teachers use questions, particularly comprehension questions, in introducing topics and in responding to student answers, whereas field-dependent teachers use questions as a check on student learning following instruction (Moore, 1973).

Since learning takes place through continuing interaction between teacher and student, the act of learning must inevitably bear the imprint of the cognitive styles of both participants. More than that, however, the full contribution of cognitive style is surely more than the sum of the contributions of each participant's style. Particular combinations of characteristics of individuals produce, as fresh emergents, unique characteristics of the

interaction process in which they are partners. This is proving to be true in the results of studies which have examined the combinatory effects of the cognitive styles of participants in an interaction.

The question on which most of these studies have focused is this: What are the consequences for the progress and outcomes of an interaction when its participants are matched or mismatched in cognitive style? Even on the basis of the social-orientation vs. impersonal-orientation aspect of cognitive style alone, it is easy to imagine that differences in teacher-student mix will make for differences in a variety of classroom behaviors, including student learning.

The match-mismatch issue has been examined in two recent studies of teacher-student interaction. One, by DiStefano (1969), used as subjects teachers and students in a regular classroom situation. DiStefano found that, in their responses to several questionnaires, teachers and students matched to each other in style viewed one another positively, whereas teachers and students who were mismatched viewed each other negatively. It is impressive that the positive and negative evaluations included not only personal characteristics but intellectual characteristics as well. Another more recent study by James (1973), in which a specially created mini-course was used, confirmed DiStefano's results. Responses to questionnaires similar to DiStefano's showed significantly greater interpersonal attraction in matched than in mismatched teacher-student combinations. One additional result is worth citing because it is so striking. At the end of the course each teacher was asked to assign grades to the six students in his class, three field dependent and three field independent, on the basis of their classroom performances. The most extremely field-independent teacher gave all three of his field-independent students higher grades than his three

field-dependent students. Conversely, the most extremely field-dependent teacher assigned the three highest grades to his three field-dependent students. Since grades were based on classroom impressions, they are undoubtedly at least as much a reflection of interpersonal attraction as of student achievement.

These findings from studies of teacher-student interaction receive support from the similar results obtained in studies which examined match-mismatch effects in both patient-therapist and peer interaction. In one study, by Greene (1972), patients treated by therapists similar to themselves in cognitive style experienced their therapists as feeling more positively toward them than did patients of therapists with styles opposite to the patients'. Examination of the items which make up the Berent-Lenard Relationship Inventory, used to evaluate patients' feelings, give some clues as to what it is that patients valued as positive in therapists matched to them in cognitive style. The items in the Inventory fall into four categories: therapist's level of regard for the patient; unconditionality of the therapist's regard; therapist's empathic understanding of the patient; and genuineness of the therapist's feeling for the patient. What seems involved in the positive outcome with the matched dyads is thus a sense of being better understood and more highly valued.

A second study of match-mismatch effects in therapy, done by Folman (1973), found, consistent with Greene's results, that patients treated by therapists matched to them in cognitive style viewed their therapists more positively than patients from mismatched patient-therapist dyads; in addition, therapists, on their part, valued more highly patients with styles similar to their own. Folman's study also showed that patient drop-out rate was lower for patients from matched than from mismatched patient-therapist dyads.

Drop-out rate is a commonly used achievement criterion in therapy studies. Thus, Folman's study provides evidence that matching for style has positive consequences not only for interpersonal attraction, the outcome effect to which the studies considered thus far have been limited, but also for achievement of the goal for which the interaction is undertaken.

Lending further support to the conclusion that there is greater mutual attraction among individuals of similar cognitive style is the result of a study of peer interaction by Welkowitz (personal communication). The Welkowitz study is of particular interest because of the real-life setting in which it was conducted. Second-year roommates at a relatively small university were assessed for field-dependence-independence. At this university, students in the second year are allowed to choose their own roommates. A significant correlation in scores between roommate pairs was found, suggesting a tendency for roommates to select each other on the basis of similarity in extent of field dependence.

The evidence now on hand seems to establish match or mismatch in cognitive style as a significant factor in social interaction. To have demonstrated that a match-mismatch phenomenon exists is to have opened the door only a crack. What is already visible through that crack suggests, however, that we may find much of interest behind it for issues of student learning and for other educational issues as well. We obviously have a long way to go, though. Let us identify some of the research steps which now lie ahead.

First, studies are still needed to determine whether matching for cognitive style does indeed make for better student learning and not only for more positive feelings. While there is yet no evidence on whether students taught by teachers matched to themselves in cognitive style actually learn more, their greater liking of such teachers may well create an atmosphere which facilitates learning. In considering student achievement, the possibility

must be examined that for some kinds of learning, a contrast in style between teacher and student may prove more stimulating and so actually foster learning. We must also think of the consequences of homogeneity or heterogeneity in cognitive style among students themselves, again with the possibility that heterogeneity may result in diversity of viewpoints and perspectives, thereby making the classroom more lively.

As a second research step, we need to find out more about how match or mismatch in cognitive style works to produce the effects observed. For this purpose, a microscopic examination needs to be made of the processes of interaction which lead to a positive outcome with match and a negative outcome with mismatch.

As a third research step, we need to identify characteristics of students--or of people, for that matter--which are so salient that they come through in their positive or negative aspects for all to perceive. For example, in one of our studies we observed that match or mismatch in sex of student and teacher had such a potent effect on mutual attraction as to obscure and even counteract cognitive style match-mismatch effects. As a second example, in another one of our studies we examined the interaction of each of a group of subjects, on one occasion with a partner similar in cognitive style and on another occasion with a partner of opposite cognitive style. One side finding, relevant here, is that in several cases, the mutual attraction ratings made of the subject by both her partners were extremely low. It is a deeply embedded quality of some people that they are just not very lovable, even to those who out of similarity in style are prepared to love them.

There is a fourth issue that needs careful examination to deepen our understanding of match-mismatch effects. This is the role of situational variables in moderating the influence of match or mismatch in cognitive style.

The issue is one which has been taking a good deal of our own research attention recently. And we already have evidence from one study that, as common sense indicates, there are circumstances under which match in style does not produce a positive outcome. In that study, subjects with conflicting positions on a given issue were asked to resolve their conflict through discussion. The starting premise of clear conflict, of course, makes this situation different from that in the teacher-student, patient-therapist and peer interaction studies we reviewed earlier. Both frequency of conflict resolution and interpersonal attraction were examined at the end of the discussion period in three kinds of dyads: two field-dependent partners, two field-independent partners, and a field-dependent and field-independent partner. Conflict resolution is likely to be facilitated by accommodation of one partner to the position of the other partner. The sensitivity of field-dependent persons to cues from others, and their tendency to take account of other people's views, are qualities which should contribute to accommodation. Accordingly, we anticipated that dyads containing one or two field-dependent partners would be more likely to reach agreement than dyads in which both partners were field independent. Moreover, to the extent that reaching agreement is likely to make for better feelings between partners, we expected greater mutual attraction in dyads with one or two field-dependent partners than in dyads with two field-independent partners. Both with respect to frequency of agreement and level of mutual attraction, the outcome was as expected. So, as you see, although matched, two field-independent partners did not do very well together; on the other hand, two field-dependent partners, also matched, did do well. To the extent that task requirements help determine which qualities of people are brought to the fore, it is not surprising to find that situational variables interact with match-mismatch variables to influence the outcome of an interaction.

Obviously there is much more we need to know in a domain that is clearly complex and still little explored before we can even approach the practical question of whether match in cognitive style should be used in composing teacher-student groups. An aptitude-treatment interaction approach, seeking to identify learning conditions most effective for different types of students, is, of course, basic to cognitive-style research on teaching and learning. Only through systematic match-mismatch and aptitude-treatment-interaction research will we be able to characterize cognitive-style components of teacher-student interaction and identify teaching techniques and situations which maximize learning for students of different cognitive styles.

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